

The extinction law at high redshift

Simona Gallerani (Scuola Normale Superiore di Pisa), Roberto Maiolino (University of Cambridge)

We analyze the optical-near infrared spectra of 33 quasars with redshifts $3.9 < z < 6.4$ with the aim of investigating the properties of dust extinction at these cosmic epochs. The SMC extinction curve has been used to reproduce the dust reddening of most quasars at $z < 2.2$; the main goal of this work is to investigate whether this curve provides a good prescription for describing dust extinction at higher redshifts or not. We fit the observed spectra with synthetic absorbed quasar templates obtained by varying the intrinsic slope (a), the absolute extinction (A_{3000}) and by using grid of empirical and theoretical extinction curves. We find that seven quasars in our sample require substantial extinction ($A_{3000} > 0.8$), and are characterized by very steep intrinsic slopes ($a < -2.3$). All of the individual quasars require extinction curve deviating from the SMC, with a tendency to flatten at $\lambda < 2000 \text{ \AA}$ (rest frame). We obtain a mean extinction curve at $z > 4$ by averaging the extinction curves inferred for individual quasars. In the case of BAL quasars the mean extinction curve deviates from the SMC at a confidence level $> 95\%$. The different extinction curves in quasars at $z > 4$ relative to quasars at lower redshift suggest either a different dust production mechanism at high redshift, or a different mechanism of processing dust into the ISM.